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## **Business Success: Factors leading to surviving and closing successfully**

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## **Abstract**

This paper focuses on the startup factors that lead to new firms remaining open, and if they close, the factors leading to whether the owner considered the firm successful at closure. Two independent logit models were developed for closure and success characteristics using the Bureau of the Census' Characteristics of Business Owners (CBO). Business Information Tracking Series (BITS, formerly the LEEM), also from the Bureau of the Census, was used to evaluate business survival rates as the CBO had non-response bias with respect to closure.

About half of new employer firms survive at least four years (an estimated one-third of non-employer firms survive this period), and of the firms that closed, owners of about a third felt the firm was successful at closure. Major factors leading to remaining open are having ample capital, having employees, having a good education, and starting for personal reasons (freedom for family life, or wanting to become one's own boss). If the firm closed, major factors leading to owners perceiving the business successful at closure are having no start-up capital or ample capital, having previous ownership experience, and avoiding the retail trade industry. Owners of firms with and without employees had similar rates of believing closed businesses were successful at closure. Owners who were young or started without capital had a higher likelihood of closure but when they closed, they were more likely to consider the firm successful. Gender, race and being older play a small, if any, role in survivability or in owners' perception that the closed firm was successful. Retail trade was the only variable that led to businesses being more likely to close, and more likely to be deemed unsuccessful by the owner at closure.

**Keywords:** U.S. Census Bureau CES paper, business survival, new businesses, new firms, business closings, business failures, business success, business turnover, small business owners, demographics, self-employment, dissolution rates, survival factors, success factors, logit model, CBO data, BITS data

## Table of Contents

Introduction .....	1
Background .....	1
Data .....	3
Firm Survival .....	6
Success Status for Closed Firms.....	11
Conclusion .....	15
Appendix A – Data Issues .....	17
Appendix B – Model Checks .....	19
Appendix C – Model Output .....	21
References.....	25

## Introduction

For the economy to evolve new firm entry is vital to add new ideas and processes and exit is vital to eliminate inefficient uses of resources. For the individual entrepreneur staying in business after entry --or closing while successful-- is what is important.<sup>1</sup>

Using newly available microdata from the U.S. Census Bureau's Characteristics of Business Owners (CBO) covering almost all industries in the U.S. economy, this paper shows what factors enable firms to stay open. In addition, closed firms are modeled to determine which factors led to owners feeling that the firm was successfully at closure. With this research, potential entrepreneurs can better gauge their likelihood of success and researchers can see the benefits of segregating closures into "failure" and "success" categories.

The following lists the sections presented after the introduction: background information, data, firm survival, success status of closed firms, and appendices containing information on specific data issues, and model stability.

## Background

From a theoretical perspective, industrial organization focusing on firm life cycles (entry, growth, decline and exit) has evolved into three categories; business turnover (entry and exit), business growth and business survival (or longevity). Business turnover centers on Schumpeter's (1962) "creative destruction" evolving the economy as inefficient resources are freed up from business closures become available to new businesses. Reynolds (1987) added that new firms are a force of innovation and economic growth. Caves (1998) pulls the arguments together and discusses productivity growth associated with business turnover.<sup>2</sup> Business growth studies (and consequently average firm size and market structure) are often built upon theories developed by Gibrat (Sutton, 1997) on growth proportional to size, Lucas (1978) on the average firm size increasing as managerial talent is lured from small firms to large firms, and Jovanovic (1982) on inefficient firms closing and efficient firms growing after learning their abilities. Survival determines business turnover and growth rates and relates to the theories above.<sup>3</sup>

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<sup>1</sup> The terms firm and business are used interchangeably throughout this paper and represent the aggregation of all independent business activity by an organization or individual in all business locations.

<sup>2</sup> In an average year, the economy ingests and digests about 10 to 15 percent of employer firms; the figures are around 20 to 25 percent for a five year period (U.S. Small Business Administration, 1998).

<sup>3</sup> The CBO data does not lend itself well to creating an efficiency measure to test the inefficient firms close hypothesis, using say rate of return, as profit responses were categorical and input capital and labor are also based on multiple categorical responses. However, the goal of this paper is to focus on

From an applied perspective, researchers have conducted various studies to analyze business survival (see Robb, 2000; Gadenne, 1998; Stearns, Reynolds, Williams, 1995; Audretsch, 1994; Phillips, Kirchhoff, 1989; Bates, Nucci, 1989; Foley and Green, 1989; Peterson, Kozmetsky, Ridgway, 1983). Unfortunately, previous business closure studies are often inconsistent with each other (Haswell and Holmes, 1989).

Data limitations may have confounded efforts, as many previous studies have used different definitions, focused on selected industries such as retail or manufacturing, selected geographic areas, employers only and/or used data sources that could be called questionable.<sup>4</sup> The databases also often struggle to find new firms, determine when firms close, and determine the status of the business at closure.

Possibly for the reasons above, the belief that small business closure rates are high (e.g. 3 out of 4 new firms close within their first year) still exists. Overall Nucci (1999) states, “the availability of comprehensive and consistent information on business closings, or dissolutions, remains limited.”

But some consensus exists. It is generally believed that business closure rates generally decline with age (excluding the first year or so where financial losses may be expected and/or accepted in pursuit of future gain) and size.<sup>5</sup> Identifying the possible reasons firms close sheds light on why business closure rates decline with age and size. Firms dissolve because of bad financial performance (due to a myriad of reasons), lack of financing and/or capital, the owner’s health, an opportunity for the owner to obtain a better job elsewhere, selling of the business and/or the economy.<sup>6</sup> While all of these could occur sooner or later, one would expect larger and older firms to be more able to weather storms, have learned from experience, and have more room to shrink the business instead of closing the business. In addition, one

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the startup factors contributing to survival and success not the managerial decisions. In addition, while the growth theories often focus on economic results, the inclusion of non-employers and gauging the closing of a successful business allows analysis of economic and social factors on both growth-style and life-style (businesses started with the goal of creating your own working environment, such as working from home) businesses.

<sup>4</sup> Williams (1993) illustrated the limitations of using Dun & Bradstreet as a source for business survival, and other studies have relied upon small surveys or small slices of data available from government agencies. This is not meant to imply that the previous studies are in any way flawed, but attacking a data source as “no good” or “not representative of most firms” is a quick way for critics to dismiss findings.

<sup>5</sup> Nucci (1999), using the Bureau of the Census’ Standard Statistical Establishment List (SSEL) and focusing on all age categories (not just new establishments), reconfirms this generally held belief. Nucci used data on establishments (which can belong to existing firms), however the findings for establishments are believed to also hold for firms as most establishments, particularly new firms, belong to single establishment firms.

<sup>6</sup> Everett and Watson (1998) grouped the causes into three categories; the economy, industry, and firm performance. Focusing on retail trade and services, they found the economy was a reasonably large

would expect “easier in, easier out” conditions to occur as owners with little time and money sunk in a firm could move on to other ventures with relative ease.

Previous researchers have also classified business closures as a business failures (Watson and Everett, 1996 and 1993). This is not necessarily the case as closing firms could have been financially successful and closed due to sale of the firm, or a personal decision by the owner such as accepting employment with another firm, health problems, or retirement. The reasons for closure consist of successes and failures, but defining success and failure often entails difficulties. Watson and Everett (1996 and 1993) note that five criteria for failure are often used; businesses that cease to exist (discontinuance for any reason), business that close or change ownership, filing for bankruptcy, closure to limit losses, and failure to reach financial goals. Jennings and Beaver (1997) add that using financial criteria does not take into account the intangibles of the owners. They define success as “the sustained satisfaction of principal stakeholder aspirations.”<sup>7</sup>

This paper uses a combination of the criteria mentioned above for evaluation. Business survival is analyzed to get a perspective on the sustainability of ventures. In addition, owners were used to determine the status at closure.

## Data

Studying businesses that opened from 1989 to 1992, data limitations of many of the previous studies are overcome by using two relatively new U.S. government data sources, Business Information Tracking System (BITS) and the Characteristics of Business Owners (CBO) that cover most industries in the U.S.<sup>8</sup>

BITS is a longitudinal microdatabase of the universe of private sector employers in all industries excluding farms, railroads and household employees in the entire U.S. (Robb, 1999). This definition led to a universe of 5,095,356 employers in 1992.<sup>9</sup> BITS is currently available from 1989 to 1997. BITS contains information on the establishment's location, the establishment's industry, the establishment's employment, the establishment's payroll, the establishment's start year and the enterprise's employment. BITS is part of the Statistics of U.S. Business (SUSB) program at the Bureau of the Census. SUSB is

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factor in failure. Everett and Watson (1995) also found failure could be positively correlated with employment rates.

<sup>7</sup> Morel d'Arleux (1999) also used owners' own opinions to evaluate professional, and personal success.

<sup>8</sup> Both data sources were funded in part by the Office of Advocacy, U.S. Small Business Administration, and were produced by the U.S. Census Bureau. See Appendix A for descriptions.

<sup>9</sup> BITS microdata data is available to approved researchers at the Bureau of the Census' Center for Economic Studies (<http://www.census.gov/cecon/www/ces.html>) and BITS and SUSB tabulations are available at [http://www.sba.gov/advo/stats/int\\_data.html](http://www.sba.gov/advo/stats/int_data.html).

essentially an extension of the County Business Patterns program (which produces yearly tabulations on establishments by county and is based on the Standard Statistical Establishment List or SSEL) and links establishments owned by parent companies.

BITS is used here to establish survival rates of new businesses. Non-respondent employers from the CBO were matched to BITS and compared to respondents with regard to survival.

In 1996, the CBO surveyed firms and owners in existence in 1992. The CBO universe was business tax returns with \$500 or more in sales in 1992 excluding C-corporations (Headd, 1999). This definition led to a universe of 17,253,143 businesses in 1992. The CBO collected information such as owner type, age, education, work experience, veteran status, industry, financing, home-based, exporting, franchising, profits, etc. The CBO over sampled women and minority owners and weighted the microdata to account for the over sampling. The survey was an extension of the Survey of Minority-Owned Business Enterprises (SMOBE) and Survey of Women-Owned Businesses (WOB) both based off the SSEL within the economic census. About 62 percent of the 78,147 firm surveys (67 percent of the 39,705 employer firm surveys) and 59 percent of the 116,589 owner surveys were returned.<sup>10</sup>

The CBO is used here to assess factors leading to survival and success status at closing. The non-employer information (self employed individuals without employees) from the CBO enables studying business survivability and success closer to the start-up process.<sup>11</sup>

Because the CBO was conducted four years after the known existence of the firms, survival analysis was possible and because the CBO asked the status of the business at closure, success status at closure analysis was possible. The question asked of owners of closed businesses was, "Which item below best describes the status of this business at the time the decision was made to cease operations (successful, unsuccessful)?" This allows the owner to consider personal and financial factors (which are often difficult to measure) in determining the status of the business at closure.<sup>12</sup> While certain owner types may be more or less predisposed to optimism or low goals, one can not discount the positive business experience even if expectations are originally low.

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<sup>10</sup> CBO microdata data is available to approved researchers at the Bureau of the Census' Center for Economic Studies (<http://www.census.gov/cecon/www/ces.html>) and CBO tabulations are in the CBO report at <http://www.census.gov/prod/www/abs/business.html#ent>.

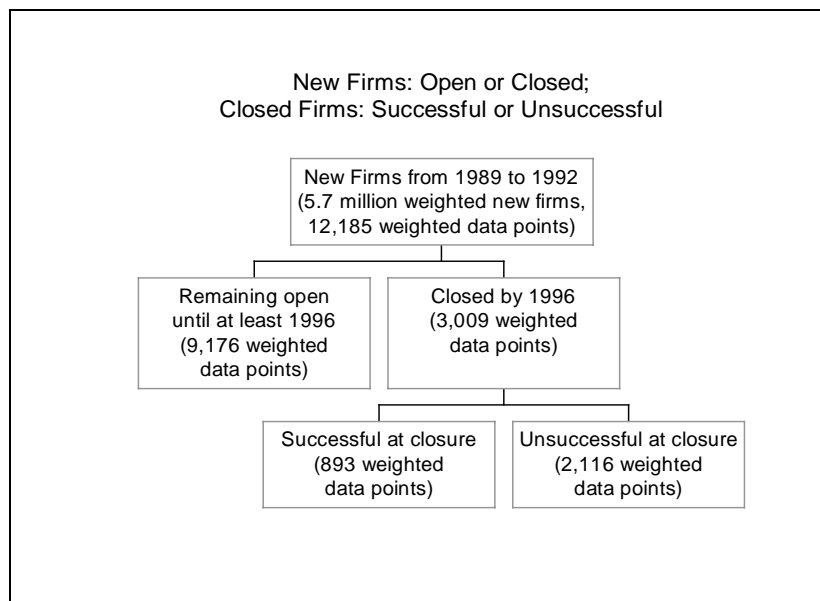
<sup>11</sup> In some cases, employer firms can be viewed as non-employers that were able to survive and grow.

<sup>12</sup> A potential problem exists here of a firm opening, operating successfully and then closing unsuccessfully. However, it is hoped that evaluating firms that remained in business for a relatively short period of time, opening from 1989 to 1992 and closing by 1996, will limit this problem.



Data quality using the CBO for closure analysis was an issue. For the CBO, firms that existed in 1992 were surveyed in 1996, so it was a concern that unreturned surveys would be skewed toward firms that closed (artificially increasing the CBO survival rates).<sup>13</sup> For the non-responding employers (employers were known from CBO's parent data source, the SSEL), BITS was used to determine whether the firm began between 1989 and 1992 and if it remained open by 1996.<sup>14</sup> This matching shown in Table 1 below clearly demonstrates that the unreturned surveys were more likely to be firms that closed.<sup>15</sup> Therefore, evaluating the CBO for survival rates without adjusting for non-response bias would produce erroneous results.<sup>16</sup>

The figure below illustrates the flow of the CBO data used for analysis and how this paper is organized. Data issues are presented in the appendices.



<sup>13</sup> Firm weights from the CBO were used to create an accurate universe to account for the survey of a non-random sample (women and minorities were oversampled) and these weights were normalized.

<sup>14</sup> An employer firm in the BITS could be reduced to a firm without employees and stay open, however that possibility can not be analyzed using BITS.

<sup>15</sup> The CBO and BITS both use the Bureau of the Census' SSEL for some information but differ in their properties. The CBO considered tax returns (and excludes C-corporations) filed by the same business in the same industry as a business unit, while BITS uses the establishment with a link to and data for the enterprise (and excluded farms, railroads and household employees). Matching the CBO non-response to BITS showed the CBO is essentially an establishment database (but employment used in the model was based on the enterprise). New firms are almost always single establishment firms.

<sup>16</sup> Adjusting the weights in the CBO for employer firms could reduce the non-response issue for survival analysis. But assuming that the characteristics of the non-respondents did not differ from the respondents, weight adjustments for non-response bias was not needed for the logit model which compares the characteristics of one group to another, not the quantity of one group to another.

## Firm Survival

As stated above, one would expect larger firms and firms with more resources (financing, education, etc.) to fare better than average with regard to survival.

BITS shows that about two-thirds of employer firms survive at least 2 years and about half survive at least 4 years. These figures are similar to Phillips and Kirchhoff's (1989) analysis using Dun and Bradstreet's (D&B) database, which as a data source has been questioned (Phillips and Kirchhoff focused on new firms while other researchers often focused on existing firms).<sup>17</sup>

While the CBO survival rates are skewed, it does indicate that non-employer business (self-employed without employees) closures are a little over seventy percent of employer business closures (presuming that non-employer and employer non-response bias is similar).<sup>18</sup> Rough estimates using BITS and CBO figures show that half of non-employers would survive about 2 years, and about a third would survive 4 years (ratio of CBO non-employers to employers multiplied by BITS employer survival figures).<sup>19</sup>

Table 1. New firm survival rates from various sources (percentages)

Data source Firm type	CBO Non- Employers	CBO Responding Employers	CBO Non-responding Employers	D&B Employers	BITS Employers
Year started	1992	1992	1992	1976-78	1989-1992
Still open after 2 yrs.	68.4	95.3	64.1	76.3	66.0
4 yrs.	54.0	75.4	45.0	47.3	49.6
6 yrs.	--	--	--	37.8	39.5

Notes: The CBO excludes C corporations; BITS figures exclude farms and firms starting with multiple-establishments (a relatively rare occurrence). BITS survival rates for the start years 1989 through 1992 only differed by a percent or two. BITS survival rates for single establishment firms that started in 1992 but did not respond to the CBO were 57.0 percent for 2 years, and 43 percent for 4 years. Dun and Bradstreet figures are believed to be "mostly" employers.

Using BITS, various industries have similar survival rates for employers, with services and manufacturing having slightly higher than average survival rates (see Table 2 below). Retail trade had slightly lower survival rates. The manufacturing result is probably because it has large economies of scale, requiring

<sup>17</sup> Phillips and Kirchhoff point out some difficulties in using the D&B database for survival analysis. D&B may not have found the newest firms, the researchers had to rely on the date of entry into the database as a firm's "birth date", and there was often a time lag before a firm was purged from the database. These factors could have artificially increased survival rates in their study.

<sup>18</sup> However, non-employers, which are often home-based, could be more likely to respond than employers when they are closed because they could be found at the same address listed in 1992 in 1996, but may also more likely to move while remaining open.

<sup>19</sup> This confirms Bates and Nucci's (1989) point that firms without employees are very volatile and should be a factor when studying discontinuance of business sets that include employers and non-employers.

larger start-up capital, which enables firms to “buy” time before performance can be evaluated. Service industries are generally low in capital requirements, and are of the “easy in, easy out” variety, so it is surprising that their survival rates were higher than average.

Table 2. New firm survival rates by industry (percentages)  
(employer firms born between 1989 and 1992)

Still open after	Total	Manufacturing	Retail trade	Services
1 year	81.7	84.2	83.2	84.9
2 years	66.0	69.4	67.2	71.5
3 years	56.5	59.5	56.7	62.6
4 years	49.6	52.5	49.0	55.7

Notes: Excludes farms and companies starting with multi-establishments (a relatively rare occurrence). There were 2.31 million new employer firms for the period (0.12 million manufacturing, 0.50 million retail trade, 0.79 million services and 0.89 million other and unclassified). If a firm's industry was unclassified in its first year, the second year's industry classification was used. The other industry category had a survival rate of 66.2 percent after two years and 49.0 percent after four years while the unclassified category had 15.2 and 9.4 percent, respectively. The unclassified industry category had some firms that opened and closed so quickly that an industry classification was not established.

A firm weighted logit model was used to determine start-up factors leading to closures in a relatively short time period (up to 8 years).<sup>20</sup> Table 3 summarizes the data used and Appendix A provides database descriptions and adjustments needed to account for data discrepancies.

In evaluating closures, years in business (YRS\_BUS) obviously plays a large role (and can lead to the advice, "to stay in business you need to stay in business"). To avoid this censoring problem, the years in business variable has been discarded for the closure model. In addition, it was a concern that employers and non-employers (and those starting at home) might have different non-response bias.<sup>21</sup> However excluding the variables for employers (EMPL) and starting at home (HOM\_STRT) only made the variables for the number of owners (OWNERS) and starting capital greater than \$50,000 (SFIN\_G50) a little more relevant while affecting the other variables little.<sup>22</sup>

The percentages of closures are probably higher because of non-response bias mentioned earlier, and are presented below with the judgement that this bias is not correlated with variables in the model.

<sup>20</sup> Competing risk analysis focusing on three possibilities stayed open, closed successful and closed unsuccessful could have been joined into multinomial logit model. However, the closure and success models were kept independent to allow different functional forms and to focus on the issues of factors leading to staying open, and if the business closed, the factors leading to perceived success.

<sup>21</sup> See footnote 15.

<sup>22</sup> Unfortunately, missing information on whether a firm was Asian or Hispanic-owned for many of the records forced these variables out of the model (hopefully this omission will not affect the model much as

Closure rates among the variables reveal that employers and firms with starting capital greater than \$50,000 have low closure rates, and young owners (O\_L35YR) and firms with no starting capital (SFIN\_NON) have high closure rates.<sup>23</sup> Industry differences are also as expected with manufacturing (IND\_MAN) having lower closure rates than service (IND\_SERV) and retail trade (IND\_RETL) firms.<sup>24</sup>

The following model below is used to determine the business and owner traits that are functions of survival.<sup>25</sup>

Survival = F[business traits (financing, industry, location, employer, home-based, number of owners), owner traits (gender, race, age, education, reasons for starting, previous experience)]

It was hypothesized that firms that have more resources would have a higher likelihood of survival or business traits of the larger of small businesses would be positively correlated to survival (i.e. higher levels of financing, manufacturing, being an employer, not being home-based, having numerous owners). Also, gender (FEMALE), race (BLACK) and starting for personal reasons (O\_SRT\_PR) would seem irrelevant to survival but older owners (O\_G55YR), more educated owners (O\_ED\_BAC), and owners with previous experience (O\_EXP) would seem to be more likely to be positive correlated with survival.

Table 4 below shows the output for the closure models. Model 1 shows that manufacturing, female, black, age 55 or over, and owners with high school diplomas or less (O\_ED\_HS) variables were not relevant to the model. So the slightly higher than average closure rates for female and black owners is most likely the result of other personal and/or business characteristics. These variables were incrementally removed with little impact on the remaining variables and the model's fit.

Model 2 is the condensed model for final analysis. Because the remaining variables except number of owners, which was usually 1, are dummy variables, comparing the estimated coefficients can indicate which factors have the greatest impact.

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these variables did not have closure or success rates that differed by too much from the non-Asian and non-Hispanic averages).

<sup>23</sup> Åstebro and Bernhardt (1999) using the 1987 CBO found securing loans was a positive factor in survival.

<sup>24</sup> Audretsch and Mahmood (1995) found technology differences in industries to be a large factor in survival but the data used here limited industry classifications. In addition, Robb (2000) used slightly more detailed industry classifications than the data used here.

<sup>25</sup> The analysis here focusing on a relatively unique time period (a relatively flat economy at the start followed by strong growth), 1989 to 1996, was a limitation of the data available. However, checks were made using a firm's major industry gross state product (GSP) average yearly change for the first four years after start-up as a macroeconomic control and a dummy variable for starting in 1989 or 1990. The GSP variable had a reasonable likelihood that its beta was zero, but the start year dummy was positive, however affected the other variables little. See the end of this section for more details.

The model below reveals the factors that best explain the probability of survival are: being an employer firm, starting capital greater than \$50,000, having a college degree and starting a business for personal reasons.<sup>26</sup> Increased capital and more education both give owners increased resources to develop a business. In addition, starting capital greater than \$50,000 leading to higher survival rates might be the result of bankers evaluating intangibles and “picking the winners” by financing businesses more likely to survive. It is believed that starting a business for personal reasons gives the owner increased motivation to keep a business open. So even if the business is barely staying afloat, the owner has better business opportunities available, and/or job offers come around, the owner started for personal reasons, probably enjoys the lifestyle and would do what it takes to keep the business going. Previously owning another business, having multiple owners and being home-based at startup also seem to increase survivability. The home-based result is probably similar to starting for personal reasons, in that both appear to be lifestyle choices, and might also stem from the lower costs associated with being home-based.

Being a relatively young owner, being in services or retail trade, not having any capital, and being in an urban/suburban area led to a higher likelihood of closure. The urban/suburban (MSA) result could be from urban/suburban owners being more likely to have better business opportunities or job opportunities (having higher opportunity costs) and therefore more likely to close the business to access opportunities than their rural counterparts.

A few checks were performed on the model, time period and employer (see Appendix B for details). The main difference between the model of starts for 1989 and 1990 and the model of starts for 1991 and 1992 appears to be the value and significance of the intercept. A dummy variable for the pooled data set for starts in 1989 and 1990 was used, was positive, and affected the other variables little.<sup>27</sup>

The main difference for the employer model again is the intercept, however the two models did differ with respect to some of the variables. Unfortunately, the limited amount of data for employers led to pooling the data into one model and using a dummy variable for employer status.

In addition, a few other tweaks were tested. A variable was added to see if macroeconomic factors affected the model. This variable, the average yearly change of the firm's gross state product at the major industry level for the first four years after opening, did not have much effect on the model. Splitting

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<sup>26</sup> Results here are consistent with Bates' (1990) white vs. black owner and Bates' (1995) franchise vs. independent business finding of human capital and financing playing a key roles in survival (both of these studies focused on “medium level” start-ups by excluding firms with less than \$5,000 in sales).

<sup>27</sup> The start year dummy variable was checked after CES disclosure review therefore re-releasing the “slightly” tweaked model would have been problematic because of disclosure requirements.

the model out for men and women showed that education was less of a survival factor for women than men and being an employer was the most important survival factor for both models. Splitting the model out for blacks and non-blacks showed that the black model had a high intercept and only the employer variable was statistically significant.

Table 3: Data summary for new firms (started between 1989 to 1992)

Variable Names	Variable Descriptions	Unweighted		Weighted		
		Sum	Mean	Sum	Mean	Percent Closed (a)
SFIN_NON	No start-up capital	2,692	0.22	3,775	0.31	45.3
SFIN_G50	Start-up capital \$50,000+	2,703	0.22	872	0.07	15.0
IND_MAN	Manufacturing	940	0.08	310	0.03	29.1
IND_RETL	Retail	1,968	0.16	1,744	0.14	37.1
IND_SERV	Services	3,648	0.30	5,622	0.46	38.1
MSA	Urban/suburban area	9,694	0.80	9,508	0.78	36.4
EMPL	Employer firm	4,128	0.34	1,034	0.08	14.4
HOM_STRT	Home-based	5,654	0.46	7,800	0.64	36.7
OWNERS	Number of owners	18,055	1.48	14,279	1.17	--
FEMALE	Female-owned	4,874	0.40	4,577	0.38	38.1
BLACK	Black-owned	3,078	0.25	436	0.04	40.6
O_L35YR	Owner's age <35	2,894	0.24	3,678	0.30	43.3
O_G55YR	Owner's age 55+	1,991	0.16	2,223	0.18	35.5
O_ED_HS	High school or less	3,737	0.31	4,076	0.33	42.1
O_ED_BAC	Bachelor's or greater	4,796	0.39	4,491	0.37	28.4
O_SRT_PR	Start for personal reason	3,765	0.31	3,904	0.32	30.1
O_EXP	Owned another firm	3,346	0.27 (b)	2,634	0.22	26.8

(a) Closure percentages are presented for variable comparison purposes only (the overall weighted closure rate was 36.1 percent) because they are most likely low due to non-response bias.

(b) The CBO miscoded items as non-responsive instead of a skip pattern response (code MM). Records that had some other data reported were considered as not having any previous owning experience.

Notes: Based on 12,185 responses to the CBO (excludes 1,374 firms that were non-responsive to key variables, 165 of which it was unclear if the firm was closed). The weights were normalized to match the number of records. Appendix A lists data issues and Appendix C lists the full model output.

Table 4: Model for closures of new firms (1989 to 1992)

Variable Names	Model 1		Model 2	
	Betas	t-stats	Betas	t-stats
INTERCPT	0.43	4.9 *	0.37	4.6 *
SFIN_NON	-0.36	-8.4 *	-0.38	-8.8 *
SFIN_G50	0.55	5.1 *	0.55	5.1 *
IND_MAN	0.13	1.0	--	--
IND_RETL	-0.30	-4.7 *	-0.32	-5.2 *
IND_SERV	-0.19	-4.2 *	-0.21	-4.8 *
MSA	-0.17	-3.5 *	-0.17	-3.4 *
EMPL	0.97	10.1 *	0.98	10.2 *
HOM_STRT	0.13	3.0 *	0.13	3.0 *
OWNERS	0.13	3.1 *	0.13	3.0 *
FEMALE	-0.03	-0.6	--	--
BLACK	-0.01	-0.1	--	--
O_L35YR	-0.39	-8.6 *	-0.37	-8.6 *
O_G55YR	-0.07	-1.3	--	--
O_ED_HS	-0.08	-1.7	--	--
O_ED_BAC	0.48	9.6 *	0.52	12.1 *
O_SRT_PR	0.48	11.0 *	0.48	11.1 *
O_EXP	0.31	5.8 *	0.31	5.9 *
LogLik. Intercept	15,940		15,940	
LogLik. Model	15,007		15,013	

\* Significant at the 0.02 level

Note: Based on weighted data. Appendix C lists the full model output.

## Success Status for Closed Firms

It is hypothesized that factors leading to business survival would also lead to businesses closing successfully as these are both positive outcomes for the owner(s).

Unpublished CBO data shows that of the firms that opened between 1989 and 1992 and closed between 1992 and 1996, 29.1 percent of their owners felt the business was successful at closure.<sup>28</sup> The figures were similar for firms with employees (27.3 percent) and firms without employees (29.1 percent).

Table 5 presents weighted (normalized) and unweighted totals and averages for firms that started from 1989 to 1992 and closed between 1992 and 1996 (years in business and the number of owners are the only variables that are not dummy variables). From the percent successful information in Table 5, start-up capital seems the most surprising. Firms that start with zero or \$50,000 or more in capital both have higher rates of success at closure than firms in the middle. It is possible that firms without start-up

capital have low beginning expectations and perform labor intensive endeavors, while firms with minimal start-up capital may wind up without enough capital to achieve the minimum efficient scale for their industry. By industry, retail trade has the lowest percentage of firms closing successful and services the highest. One could argue that retail trade firms that are successful are easily discovered and replicated, while service firms are more discreet, allowing the owner to take advantage of unique skills thus lending them more difficult to copy by the competition. Being home-based at start-up does not seem to make much difference.

Women and owners under age 35 (in 1992) had higher than average success rates while black owners and starting for personal reasons (freedom for family life and wanted to become own boss) had lower than average success rates. The high rates from the under 35 crowd could be a result of the value in the learning experience and/or being enticed to close a business and work for an employer. Not surprising was that success rates generally increase with owner age, number of owners, and experience in being the owner of another business.

Table 5: Data summary for closures of new firms (started between 1989 to 1992)

Variable Names	Variable Descriptions	Unweighted		Weighted		
		Sum	Mean	Sum	Mean	Percent Successful
SFIN_NON	No start-up capital	1,060.0	0.35	1,170.5	0.39	40.6
SFIN_G50	Start-up capital \$50,000+	253.0	0.08	89.5	0.03	37.9
IND_MAN	Manufacturing	214.0	0.07	61.8	0.02	20.0
IND_RETL	Retail	437.0	0.15	442.5	0.15	13.5
IND_SERV	Services	1,005.0	0.33	1,464.8	0.49	35.4
MSA	Urban/suburban area	2,415.0	0.80	2,364.3	0.79	30.2
EMPL	Employer firm	404.0	0.13	102.0	0.03	27.3
HOM_STRT	Home-based at start	1,733.0	0.58	1,958.3	0.65	27.9
OWNERS	Number of owners	3,625.0	1.21	3,190.0	1.06	--
YRS_BUS	Years in business	10,205.0	3.39	9,744.1	3.24	--
FEMALE	Female-owned	1,313.0	0.44	1,192.4	0.40	31.9
BLACK	Black-owned	1,067.0	0.36	120.9	0.04	20.4
O_L35YR	Owner's age <35	900.0	0.30	1,089.6	0.36	36.9
O_G55YR	Owner's age 55+	467.0	0.16	539.0	0.18	29.6
O_ED_HS	High school or less	1,084.0	0.36	1,173.4	0.39	23.6
O_ED_BAC	Bachelor's or greater	929.0	0.31	871.4	0.29	37.4
O_SRT_PR	Start for personal reason	816.0	0.27	803.7	0.27	21.5
O_EXP	Owned another firm	525.0	0.17	482.4	0.16	40.8

Notes: Based on 3,009 responses to the CBO (excludes 191 closed firms that were non-responsive to the status of the business at closure and 387 closed firms that were non-responsive to key variables). The weights were normalized to match the number of records. Appendix A lists data issues.

<sup>28</sup> Non-response bias may not be much of a concern with the status of a closing business. While non-response may be skewed toward firms that closed, it is not believed that firms that closed successfully would be more or less likely to be found and respond to the CBO than firms that closed unsuccessfully.



The following model below is used to determine the business and owner traits that are a function of success for closed firms.

$$\text{Success} = F[\text{business traits (financing, industry, location, employer, home-based, owners, firm age),} \\ \text{owner traits (gender, race, age, education, reasons for starting, previous experience)}]$$

For closed firms, one would expect employment size, years in business, and start-up capital to be positively correlated with success at closure. Service and home-based business would seem to be negatively correlated with success, as generally these have fewer barriers to entry and thus are believed to be more competitive. One also expect that success rates at closure would increase with the owner's age, education and previous experience as an owner, as older, higher educated, and more experienced owners could provide more skills and more capital. Gender and race would seem irrelevant for success or failure. Finally, the reason for starting the business might present the best opportunity to gauge expectations, with personal reasons representing low expectations.

There is some concern that employment size, start-up capital, and years in business are correlated. In addition, employment size and years in business could be the result of growth (which would be a function of success), and start-up capital could be a measure of determination to achieve success.

In Table 6 below, model 3 (a firm weighted logit model) shows that the signs (or positive or negative impacts on success) generally agree with what was expected except for start-up capital. While it is unclear why owners with no start-up capital were more likely to consider their closure successful, possible explanations are low beginning expectations, conducting a project that has a definitive end (i.e. working on a contract or selling off collectibles), or engaging in a business solely to enjoy the life-style. In addition, while the female variable has a positive coefficient and the black variable has a negative coefficient, neither variable are particularly strong indicators. The variable for starting a business for personal reasons turned out to be a negative factor for success. Possible reasons for this include not dedicating as much effort to the business as individuals that were taking advantage of business opportunities and/or not having the skill set or knowledge needed to create a successful business.

It does not appear that growing from a non-employer firm to an employer firm skews success towards employer firms (the other variables changed little when the employer variable was removed). The home-based and number of owners coefficients also are surprisingly small with low t-statistics. Apparently, the three business size indicators (being an employer, being non-home-based and having multiple owners) do not have much impact on the success status of closed businesses.

Incrementally, employer firm, manufacturing, black-owned, number of owners, home-start, owners aged 55+, bachelor's degree or greater, and urban/suburban location variables were dropped without having much of a statistical impact on the model's overall fit. After removing the variables from the model, the remaining ten variables were statistically little changed, as shown in Table 6, while creating a more simplistic model (model 4).

Model 4 shows that starting without capital, starting with \$50,000 or more of capital and being the owner of a previous business had the largest impact on whether the owner considers the business successful.<sup>29</sup> Firms with relatively young owners, having a female owner and being in services were also positive factors leading to perceived success.

Retail trade also showed a large impact and was the most important factor to feeling a business was unsuccessful at closure. Firms with owners that had high school diplomas or less and individuals that started firms for personal reasons were less likely to achieve success. Personal reasons leading to unsuccessful closures might be from the fact that the owners of these businesses, as discussed in the closure section, enjoy the owner lifestyle and might be more likely to hold onto the business until it completely fails.

Why are starting without capital and being the owner of a previous business so strongly correlated with perceived success at closure? A possible explanation is that people who start businesses without capital undertake a small venture with little financial risk that nevertheless provides great personal satisfaction. While this type of business may not grow into a huge economic engine for the economy, it provides a great opportunity for learning. A possible explanation for the owner of a previous business variable is that seasoned business owners have the experience necessary for success and have realistic goals. Taken together, this picture of entrepreneurship shows that starting small, learning from previous mistakes and being persistent yields successful results.<sup>30</sup>

As a last exercise, a model using a broad definition of success, survivors or closing successful, was created. Many of the negative factors leading to closure; starting without any capital, being in the service industry, and owners being age 35 or less; become irrelevant to the broader definition of business success. Starting as a home-based business and the number of owners also disappeared from the broader definition of business success, but both were relatively small positive factors in whether a

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<sup>29</sup> Considering years in business averaged just above 3 years, and had a beta around 0.2, even this variable does not have as large of an impact as these 3 variables.

<sup>30</sup> Similar to the survival models, a dummy variable for starts in 1989 and 1990 and a variable for gross state product for the first four years after start-up were added to the model as a check. These variables were not relevant to the model (they had high probabilities that their betas were zero).

business survived. The two largest factors leading to business survival, being an employer and having \$50,000 or more in startup capital, were also the two largest factors leading to business survival plus closing successful. These results point out that a closure is not necessarily a failure particularly for the businesses that are more likely to be life-style businesses.<sup>31</sup>

Table 6: Model for success status at closure for new firms  
(started between 1989 to 1992)

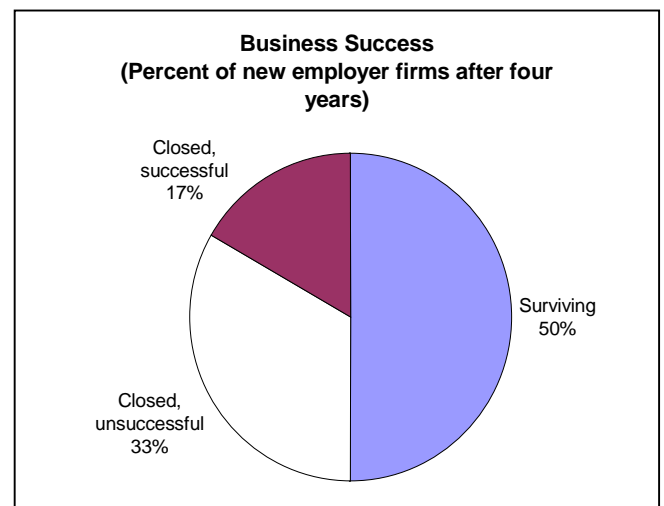
Variable Names	Model 3		Model 4	
	Betas	t-stats	Betas	t-stats
INTERCPT	-2.47	-10.8 *	-2.42	-15.5 *
SFIN_NON	1.16	11.8 *	1.19	12.3 *
SFIN_G50	0.89	3.5 *	0.92	3.8 *
IND_MAN	-0.51	-1.5	--	--
IND_RETL	-0.84	-4.9 *	-0.81	-4.7 *
IND_SERV	0.28	2.8 *	0.32	3.4 *
MSA	0.14	1.2	--	--
EMPL	-0.15	-0.6	--	--
HOM_STRT	-0.18	-1.9	--	--
OWNERS	-0.02	-0.2	--	--
YRS_BUS	0.19	6.7 *	0.19	6.9 *
FEMALE	0.25	2.7 *	0.24	2.6 *
BLACK	-0.57	-2.3	--	--
O_L35YR	0.86	8.6 *	0.83	9.1 *
O_G55YR	0.15	1.2	--	--
O_ED_HS	-0.36	-3.2 *	-0.51	-5.4 *
O_ED_BAC	0.24	2.2	--	--
O_SRT_PR	-0.51	-4.8 *	-0.50	-4.7 *
O_EXP	0.91	7.6 *	0.93	7.9 *
LogLik. Intercept	3,627	--	3,627	--
LogLik. Model	3,165	--	3,185	--

\* Significant at the 0.02 level

Note: Based on weighted data. Appendix C lists the full model output.

## Conclusion

This paper points out that not only do a large percentage of new businesses remain open for a reasonable time period, but of the ones that do close, many are successful at closure. About half of new employer firms and about a third of new non-employer firms survive at least 4 years, and of the closures, about a third are successful at closure.



<sup>31</sup> These modifications were checked after CES disclosure review therefore re-releasing the "slightly" tweaked model(s) would have been problematic because of disclosure requirements.

The variables most associated with the larger of small firms (being an employer and having multiple owners) increase business survivability, but contrary to what was hypothesized, these variables do not necessarily affect whether an owner perceived the business as successful at closure. Another variable more associated with larger new firms, having \$50,000 or more of start-up capital led to both increased survivability and success status at closing. Owners with college degrees and starting for personal reasons also had increased business survivability. Being young, the owner of a previous business, and oddly enough, starting without any capital seemed to increase the likelihood of classifying a closed business as successful. Retail trade was the only variable leading to lower survivability and a lower likelihood of success at closure.

The characteristics that an individual is born with, gender and race, do not seem to have an effect on business survival or success. It is the financing, educational skills, industry and motivation to continue the self-employment lifestyle that is needed for prosperity.

The finding that small business survival is higher than often assumed, produced from reliable data sources, and being consistent with previous findings should reduce or dispel the myth of high small business closure rates. Additionally, the differing results for factors leading to business closures and business success at closure will hopefully lead future research to consider disaggregating business closures into successes and failures at closure.

## Appendix A – Data Issues

### CBO data issues

- The CBO consists of two databases, a firm database and an owner database. Data used from the CBO was from the firm database (see Headd, 1999), except years as the owner of another business (I10C), owner age (I4A), owner education (I8A), and reasons for starting a business (I13C), which were from the owner database. These exceptions were matched to the firm data and for multiple owners (multiple responses) the owner with the greater education, age, and experience owning a previous business were used. For reasons starting a business, if the reason was the same for multiple owners, this was used.
- Due to the limitations of the data source: employer status, owners age, industry, and number of owners are based on 1992 status not start-up status.
- For 42 records with non-response (00) for still open, 00 was changed to N when year closed existed. For 13 records with 00 for still open, 00 was changed to N when closure status was Successful. For 16 records with 00 for still open, 00 was changed to N when closure status was Unsuccessful.
- The number of owners variable was created from the larger value of number of partners, general partners, or shareholders (blanks, generally sole proprietors, were set to 1 owner).
- For home based at start up, in the few instances that home start was not listed and home based in 92 was available, home based in 92 was used [the published CBO, 1992 (U.S. Bureau of the Census, 1997) indicated that home based businesses generally stay home based businesses].
- For owner experience as an owner of another business, 43 records with responses of “Not sure” were counted as none.
- Responses that did not include all tested variables (165 records without the status of the company at closure and 1,374 records with another missing field(s)) were excluded from the model and the remaining data was not re-weighted. The 1,374 records had similar characteristics as the remaining records but some small differences did exist. Adding in the non-response data into the models and using non-response dummies yielded similar results as the models without non-response data. Of the seven item non-response dummy variables (industry, finances, home-start, age, education, owner experience, and starting for personal reasons) only finances for the closure model and only age, education, and starting for personal reasons for the success model had t-stats above 2.1. The signs of the coefficients for the variables were the same for both closure and success models with and without non-response item records except for one variable in the success model that did not statistically differ from zero. The coefficients on the variables did not change much with the addition of non-response item data.

# Match of CBO Variable Names to Variable Names Used in the Models

CBO Variable Name(s)	Model Variable Name
I2A	CLOSURE
I2C	SUCCESS
I12	YRS_BUS
ACEMP92	EMPL
I14A	SFIN_NON
I14A	SFIN_G50
SIC2	IND_SERV
SIC2	IND_RETL
I21A (and I21B)	HOM_STRT
NMGNPTRS, NMSHLDRS, and NUMPTRS	OWNERS
I4A	O_L35YR
I8A	O_ED_BAC
I10C	O_EXP
I13C	O_SRT_PR
MSA	MSA
SIC2	IND_MAN
CBOSEX	FEMALE
BLACK	BLACK
I4A	O_G55YR
I8A	O_ED_HS
FRMWGT	ADJ_F_TO, ADJ_F_CL
WGT	--
API (analyzed but not used)	ASIAN
HISP (analyzed but not used)	HISPANIC

## Appendix B – Model Checks

### 1989 and 1990 Firm Starts vs. 1991 and 1992 Firm Starts

Some of the variables occur to a low percentage of firms, so as much data as possible was needed for the models. However, not having information on the firms that started and ended prior to 1992 was a worry. In the model, the open category includes firms that started from 1989 to 1991 and survived by 1992 but the closed category does not include firms that started from 1989 to 1991 and closed by 1992.

To check for stability, 1989 and 1990 were grouped and 1991 and 1992 were grouped.<sup>32</sup> As shown in Table 7, the models were similar with all variables and the intercept having the same signs, and the addition of the loglikelihood for the segmented models only differed from the pooled model by less than one percent. Some of the coefficients for the two time periods appeared to differ by a reasonable amount, but is probably the result of slicing the data “too thin” than actual differences in the time periods.

Having a limited amount of firms that opened and closed relatively quickly could have presented a problem but it does not appear to be affecting the overall model much.

Table 7: Time period check for model 2 for closure of new firms

	Starts, 1989-90		Starts, 1991-92		Total	
	Betas	t-stats	Betas	t-stats	Betas	t-stats
INTERCPT	0.71	5.7 *	0.17	1.5	0.37	4.6 *
SFIN_NON	-0.16	-2.2	-0.45	-8.3 *	-0.38	-8.8 *
SFIN_G50	0.33	2.1	0.74	4.9 *	0.55	5.1 *
IND_RETL	-0.43	-4.2 *	-0.23	-3.0 *	-0.32	-5.2 *
IND_SERV	-0.38	-5.3 *	-0.13	-2.3	-0.21	-4.8 *
MSA	-0.29	-3.6 *	-0.10	-1.7	-0.17	-3.4 *
EMPL	0.95	7.4 *	0.86	5.7 *	0.98	10.2 *
HOM_STRT	0.14	2.0	0.10	1.9	0.13	3.0 *
OWNERS	0.08	1.6	0.16	2.3	0.13	3.0 *
O_L35YR	-0.29	-3.9 *	-0.35	-6.6 *	-0.37	-8.6 *
O_ED_BAC	0.80	11.0 *	0.36	6.5 *	0.52	12.1 *
O_SRT_PR	0.48	6.7 *	0.47	8.6 *	0.48	11.1 *
O_EXP	0.21	2.5 *	0.35	5.1 *	0.31	5.9 *
LogLik. Intercept	6,039		9,703		15,940	
LogLik. Model	5,675		9,191		15,013	

\* Significant at the 0.02 level

Note: Based on weights created from using all of the 12,185 records (5,026 weighted records for 1989 and 1990, and 7,159 weighted records for 1991 and 1992).

<sup>32</sup> The recession over this time period was a worry, however similar survival rates across this time period from BITS assuaged these worries (see the footnote in Table 1).

## Employers vs. Non-employers

The closure model was segmented to see if employer and non-employer models differed. (Segmenting model 1 for employers and non-employers also revealed that the manufacturing, female and black variables had high probabilities that their coefficients were zero.)

Table 8 below shows starting capital is the main difference between the non-employers and total models. Apparently, obtaining starting capital of \$50,000 or more is very important to keeping an employer firm afloat. No start-up capital also being an important factor for employer survival is probably the result of very few data points (weighted and unweighted) for this variables (48 of the 404 closed employer data points had no start-up capital). While the home starting variable's coefficient is cut in half from the non-employers to the total model, it was pretty low to begin with.<sup>33</sup>

Creating separate models for employers and non-employers in the text of the paper would have been preferred, the limited amount of data on employers ruled out this possibility, so the data was pooled and a dummy variable for employer was used instead.

Table 8: Employer and non-employer model 2 for closure of new firms

	Employers		Non-Employers		Total	
	Betas	t-stats	Betas	t-stats	Betas	t-stats
INTERCPT	1.55	4.8 *	0.24	2.5 *	0.38	4.5 *
SFIN_NON	1.39	3.6 *	-0.41	-9.5 *	-0.41	-9.6 *
SFIN_G50	1.12	4.4 *	0.38	3.2 *	0.73	7.0 *
IND_RETL	0.67	2.1	-0.37	-5.8 *	-0.31	-5.1 *
IND_SERV	0.11	0.5	-0.22	-5.0 *	-0.19	-4.4 *
MSA	-0.55	-2.3	-0.14	-2.8 *	-0.18	-3.6 *
HOM_STRT	0.09	0.4	0.14	3.1 *	0.07	1.8
OWNERS	-0.14	-2.2	0.26	4.1 *	0.21	4.4 *
O_L35YR	-0.60	-2.7 *	-0.36	-8.3 *	-0.38	-8.9 *
O_ED_BAC	0.60	2.9 *	0.52	11.6 *	0.52	12.2 *
O_SRT_PR	0.42	2.0	0.49	10.9 *	0.48	11.2 *
O_EXP	0.24	1.1	0.31	5.8 *	0.30	5.8 *
LogLik. Intercept	853		14,824		15,940	
LogLik. Model	780		14,163		15,133	

\* Significant at the 0.02 level

Note: Based on weights created from using all of the 12,185 records (1,034 weighted records for employers and 11,151 weighted records for non-employers).

<sup>33</sup> Few employer data points may also be a factor in the sign differences between employers and non-employers with regard to the services, retail, and owners.



## Appendix C – Model Output

### Closure Model Logistic Procedure

Data Set: TMP1.C\_CLOS\_0  
 Response Variable: CLOSE  
 Response Levels: 2  
 Number of Observations: 12185  
 Weight Variable: ADJ\_F\_T0  
 Sum of Weights: 12185.000001  
 Link Function: Logit

Ordered		Total	
Value	CLOSE	Count	Weight
1	0	9176	7784.0322
2	1	3009	4400.9678

### Closure Model 1

Model Fitting Information and Testing Global Null Hypothesis BETA=0

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	15942.261	15043.516	.
SC	15949.669	15176.859	.
-2 LOG L Score	15940.261	15007.516	932.745 with 17 DF (p=0.0001) 852.362 with 17 DF (p=0.0001)

#### Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio
INTERCPT	1	0.4289	0.0871	24.2767	0.0001	.	.
SFIN_NON	1	-0.3619	0.0431	70.5761	0.0001	-0.092260	0.696
SFIN_G50	1	0.5474	0.1083	25.5426	0.0001	0.077798	1.729
IND_MAN	1	0.1343	0.1352	0.9860	0.3207	0.011667	1.144
IND_RETL	1	-0.2997	0.0631	22.5520	0.0001	-0.057868	0.741
IND_SERV	1	-0.1926	0.0454	18.0082	0.0001	-0.052941	0.825
MSA	1	-0.1735	0.0489	12.6028	0.0004	-0.039597	0.841
EMPL	1	0.9693	0.0963	101.3367	0.0001	0.148916	2.636
HOM_STRT	1	0.1258	0.0424	8.8172	0.0030	0.033293	1.134
OWNERS	1	0.1316	0.0430	9.3856	0.0022	0.063697	1.141
FEMALE	1	-0.0269	0.0419	0.4111	0.5214	-0.007181	0.973
BLACK	1	-0.00892	0.1031	0.0075	0.9310	-0.000914	0.991
O_L35YR	1	-0.3862	0.0447	74.6636	0.0001	-0.097742	0.680
O_G55YR	1	-0.0721	0.0550	1.7198	0.1897	-0.015353	0.930
O_ED_HS	1	-0.0812	0.0488	2.7704	0.0960	-0.021113	0.922
O_ED_BAC	1	0.4783	0.0500	91.3545	0.0001	0.127226	1.613
O_SRT_PR	1	0.4773	0.0434	120.7224	0.0001	0.122803	1.612
O_EXP	1	0.3083	0.0529	34.0084	0.0001	0.069977	1.361

#### Association of Predicted Probabilities and Observed Responses

Concordant = 70.1%	Somers' D = 0.406
Discordant = 29.5%	Gamma = 0.408
Tied = 0.4%	Tau-a = 0.151
(27610584 pairs)	c = 0.703

## Closure Model 2

Model Fitting Information and Testing Global Null Hypothesis BETA=0

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	15942.261	15039.194	.
SC	15949.669	15135.498	.
-2 LOG L Score	15940.261	15013.194	927.067 with 12 DF (p=0.0001) 846.658 with 12 DF (p=0.0001)

### Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio
INTERCPT	1	0.3652	0.0797	21.0106	0.0001	.	.
SFIN_NON	1	-0.3757	0.0426	77.8157	0.0001	-0.095798	0.687
SFIN_G50	1	0.5474	0.1083	25.5417	0.0001	0.077793	1.729
IND_RETL	1	-0.3167	0.0612	26.7492	0.0001	-0.061143	0.729
IND_SERV	1	-0.2067	0.0435	22.6109	0.0001	-0.056804	0.813
MSA	1	-0.1664	0.0485	11.7893	0.0006	-0.037978	0.847
EMPL	1	0.9786	0.0961	103.6762	0.0001	0.150336	2.661
HOM_STRT	1	0.1289	0.0423	9.2859	0.0023	0.034120	1.138
OWNERS	1	0.1288	0.0428	9.0584	0.0026	0.062344	1.138
O_L35YR	1	-0.3655	0.0425	74.0154	0.0001	-0.092496	0.694
O_ED_BAC	1	0.5219	0.0433	145.5279	0.0001	0.138822	1.685
O_SRT_PR	1	0.4817	0.0434	123.3608	0.0001	0.123933	1.619
O_EXP	1	0.3113	0.0525	35.0950	0.0001	0.070648	1.365

### Association of Predicted Probabilities and Observed Responses

Concordant = 70.0%	Somers' D = 0.407
Discordant = 29.3%	Gamma = 0.410
Tied = 0.7%	Tau-a = 0.151
(27610584 pairs)	c = 0.703

## Success Model Logistic Procedure

Data Set TMP1. C\_CLOS\_0

Response Profile

Response Variable: SUCCESS

Response Levels: 2

Number of Observations: 3009

Weight Variable: ADJ\_F\_CL

Sum of Weights: 3009.0000001

Link Function: Logit

(Note: Logit model was adjusted to create negative beta signs for variables that were negative factors toward success, and vice versa for positive factors.)

### Success - Model 3

Model Fitting Information and Testing Global Null Hypothesis BETA=0

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	3628.986	3203.193	.
SC	3634.995	3317.371	.
-2 LOG L Score	3626.986	3165.193	461.792 with 18 DF (p=0.0001) 432.336 with 18 DF (p=0.0001)

Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio
INTERCPT	1	2.4749	0.2296	116.1787	0.0001	.	.
SFIN_NON	1	-1.1555	0.0982	138.4512	0.0001	-0.310625	0.315
SFIN_G50	1	-0.8924	0.2555	12.2016	0.0005	-0.083590	0.410
IND_MAN	1	0.5088	0.3430	2.2007	0.1380	0.039792	1.663
IND_RETL	1	0.8403	0.1723	23.7872	0.0001	0.164109	2.317
IND_SERV	1	-0.2779	0.0990	7.8823	0.0050	-0.076580	0.757
MSA	1	-0.1411	0.1130	1.5602	0.2116	-0.031928	0.868
EMPL	1	0.1470	0.2637	0.3107	0.5772	0.014664	1.158
HOM_STRT	1	0.1762	0.0951	3.4348	0.0638	0.046328	1.193
OWNERS	1	0.0194	0.1103	0.0308	0.8607	0.004252	1.020
YRS_BUS	1	-0.1885	0.0281	44.8768	0.0001	-0.170428	0.828
FEMALE	1	-0.2545	0.0934	7.4294	0.0064	-0.068645	0.775
BLACK	1	0.5731	0.2478	5.3494	0.0207	0.062067	1.774
O_L35YR	1	-0.8553	0.0992	74.3621	0.0001	-0.226667	0.425
O_G55YR	1	-0.1476	0.1273	1.3444	0.2463	-0.031211	0.863
O_ED_HS	1	0.3611	0.1113	10.5212	0.0012	0.097123	1.435
O_ED_BAC	1	-0.2449	0.1119	4.7920	0.0286	-0.061243	0.783
O_SRT_PR	1	0.5144	0.1077	22.8242	0.0001	0.125494	1.673
O_EXP	1	-0.9053	0.1189	57.9981	0.0001	-0.183160	0.404

Association of Predicted Probabilities and Observed Responses

Concordant = 67.7%	Somers' D = 0.356
Discordant = 32.0%	Gamma = 0.358
Tied = 0.3%	Tau-a = 0.149
(1889588 pairs)	c = 0.678

## Success - Model 4

### Model Fitting Information and Testing Global Null Hypothesis BETA=0

Criterion	Intercept Only	Intercept and Covariates	Chi-Square for Covariates
AIC	3628.986	3207.283	.
SC	3634.995	3273.386	.
-2 LOG L Score	3626.986	3185.283	441.703 with 10 DF (p=0.0001) 412.807 with 10 DF (p=0.0001)

### Analysis of Maximum Likelihood Estimates

Variable	DF	Parameter Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square	Standardized Estimate	Odds Ratio
INTERCPT	1	2.4164	0.1560	239.8162	0.0001	.	.
SFIN_NON	1	-1.1855	0.0962	151.8752	0.0001	-0.318699	0.306
SFIN_G50	1	-0.9236	0.2438	14.3495	0.0002	-0.086510	0.397
IND_RETL	1	0.8063	0.1706	22.3381	0.0001	0.157469	2.240
IND_SERV	1	-0.3196	0.0954	11.2189	0.0008	-0.088084	0.726
YRS_BUS	1	-0.1918	0.0276	48.2379	0.0001	-0.173438	0.825
FEMALE	1	-0.2378	0.0928	6.5688	0.0104	-0.064132	0.788
O_L35YR	1	-0.8274	0.0910	82.7198	0.0001	-0.219274	0.437
O_ED_HS	1	0.5078	0.0942	29.0378	0.0001	0.136565	1.662
O_SRT_PR	1	0.4986	0.1061	22.0684	0.0001	0.121633	1.646
O_EXP	1	-0.9282	0.1173	62.6619	0.0001	-0.187784	0.395

### Association of Predicted Probabilities and Observed Responses

Concordant = 66.3%	Somers' D = 0.332
Discordant = 33.1%	Gamma = 0.334
Tied = 0.5%	Tau-a = 0.139
(1889588 pairs)	c = 0.666

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